
**Inventory Audit Results :
Overview Arrow TSA
March, 1996**

Audit Volume:

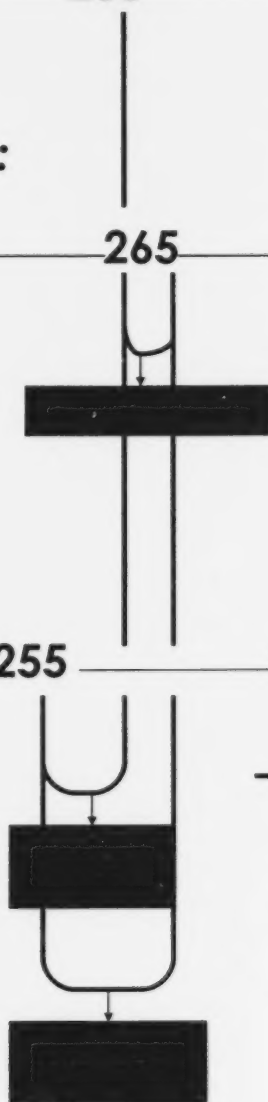
232 ————— 263 ————— 293

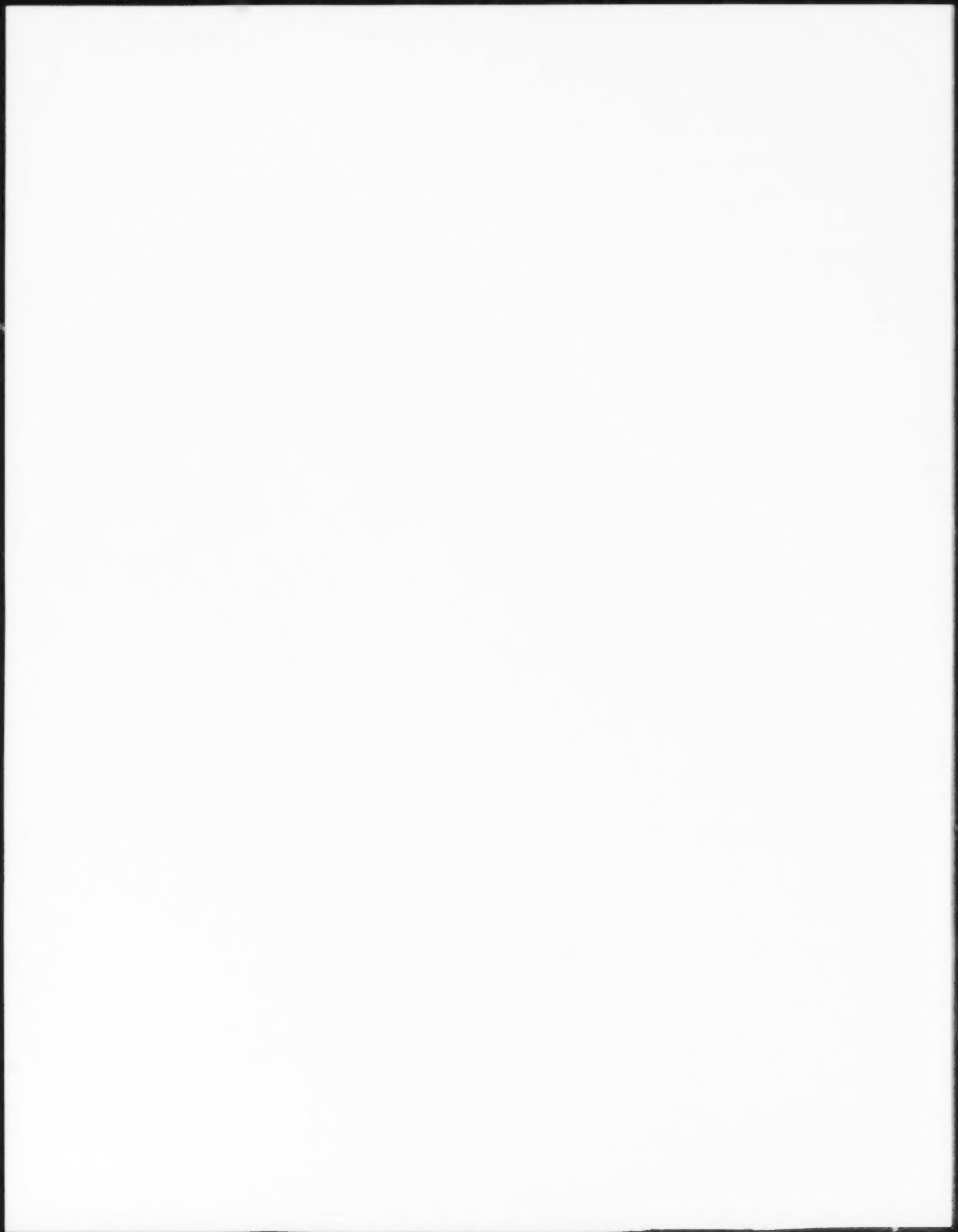
Inventory Volume:

232 ————— 265 ————— 299

**Ground Attribute
Volume:**

227 ————— 255 ————— 284





Audit Volume (Kozak) vs. Inventory Volume (Predicted in VDYP) (n=50)

1. Average Volumes/ha and Confidence Interval @ 95% (Utilization level :
12.5 cm + net merch. less decay only/Tree Class 1,2)

232 ————— **263** ————— **293** Audit Volume
(11.5% sampling error)

232 ————— **265** ————— **299** Inventory Volume
(map label attributes predicted in VDYP)
(12.5% sampling error)

2. Ratio Analysis : Ratio of Means @95%

$$R = \frac{\text{average audit volume}}{\text{average inventory volume}} = 0.99$$

1.0



0.88 ————— **0.99** ————— **1.10**

* Since 1.0 is within the interval, the ratio indicates that there is no significant difference between the audit volume and the inventory volume.

3. Paired T Test @ 95% ($\alpha=0.05$) for all sample polygons

mean difference = $-2.85 \text{ m}^3/\text{ha}$

p - value for mean difference = 0.849

*since p-value > α , the difference is not significant

4. Paired T Test @ 95% for all sample polygons by map label GTG

There were no significant differences within any of the GTGs.

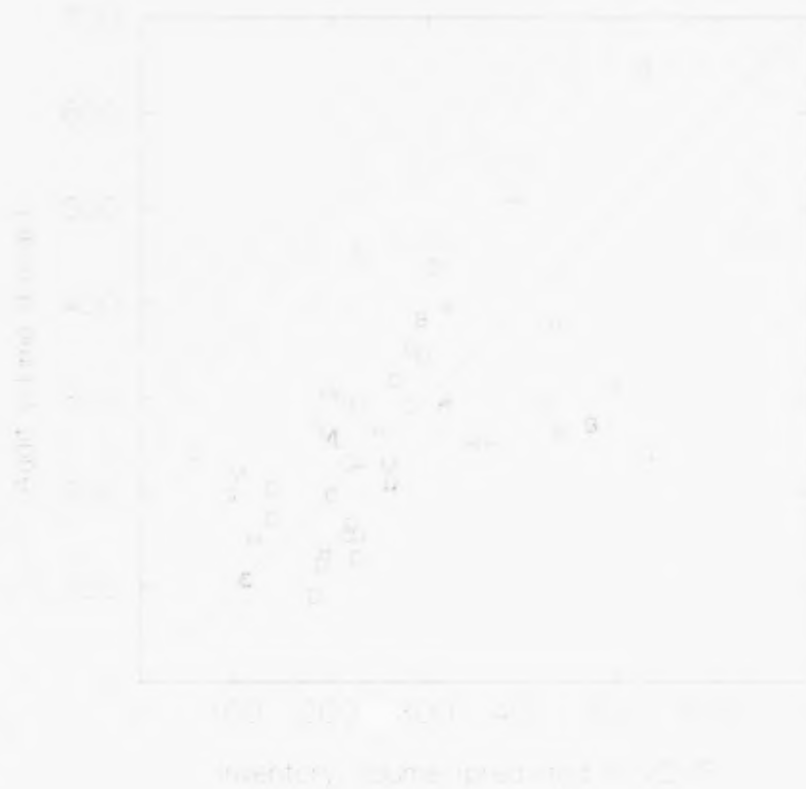
5. Correlation @ 95% ($\alpha=0.05$) for all samples

Correlation co-efficient $r = 0.559$

p value for correlation co-efficient < 0.001

$\therefore$ correlation is significant

ARROW TSA Inventory Audit:
Audit Volume vs. Inventory Volume (by GTG)
 (Tree Class 1 & 2, less decay only, 12.5cm + dbh)



Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Audit Volume (Kozak) vs. Ground Attribute Volume (Predicted in VDYP): "VDYP model" bias

1. Average Volumes/ha and Confidence Interval @ 95% (Utilization level : 12.5 cm + net merch. less decay only /Tree class 1,2))

232	————	263	————	293	Audit Volume (11.5% sampling error)
227	————	255	————	284	Ground Attribute Volume (predicted in VDYP) (11.1% sampling error)

2. Ratio Analysis : Ratio of Means @95%

$$R = \frac{\text{average audit volume}}{\text{average ground attribute volume predicted in VDYP}} = 1.03$$

1.0
↓

0.92 ——— **1.03** ——— **1.14**

* Since 1.0 is within the interval, the ratio indicates that there is no significant difference between the audit volume and the ground attribute volume.

3. Paired T Test @ 95% ($\alpha = 0.05$) for all sample polygons
mean difference = 7.16 m³/ha

p - value for mean difference = 0.607

*since p - value > α , the difference is not significant

4. Paired T Test @ 95% for all sample polygons by map label GTG
There were no significant differences within any of the GTGs.

5. Correlation @95% ($\alpha = 0.05$) for all samples

Correlation co-efficient $r = 0.551$

p - value for correlation co-efficient < 0.001

∴ correlation is significant

**ARROW TSA Inventory Audit:
Audit Volume (Kozak) vs. Ground Attribute Volume (Predicted
in VDYP) by GTG**

(Tree Class 1 & 2, less decay only, 12.5cm + dbh)



Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Ground Attribute Volume (predicted in VDYP) vs. Inventory Volume (predicted in VDYP): "Attribute" Bias

1. Average volumes/ha and confidence interval @ 95%

(Utilization level : 12.5 cm + net merch. less decay only, Tree Class 1,2)

227 ————— 255 ————— 284

Ground Attribute Volume
(11.1% sampling error)

232 ————— 265 ————— 299

Inventory Volume
(12.5% sampling error)

2. Ratio Analysis : Ratio of Means @ 95%

$$R = \frac{\text{average ground attribute volume (VDYP)}}{\text{average inventory volume (VDYP)}} = 0.96$$

1.0
↓

0.88 ————— 0.96 ————— 1.04

* The ratio indicates that there is no significant difference between the ground attribute volume predicted in the VDYP and the inventory volume predicted in the VDYP.

3. Paired T Test @ 95% ($\alpha = 0.05$) for all sample polygons

mean difference = -10.01 m³/ha

p - value for mean difference = 0.357

*since p - value > α , the difference is not significant

4. Paired T Test @ 95% for all sample polygons by map label GTG

There were no significant differences within any of the GTGs.

5. Correlation @95%($\alpha = 0.05$) for all samples

Correlation co-efficient $r = 0.763$

p - value for correlation co-efficient < 0.001

∴ correlation is significant

ARROW TSA Inventory Audit:
Ground Attribute Volume (Predicted in V/DYP) vs. Inventory
Volume (Predicted in VDYP) by GTG
 (Tree Class 1 & 2, less decay only, 12.5cm + dbh)



Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Audit Volume (Kozak) vs. Inventory Volume (Predicted in VDYP) for Operable Samples (n=44)

1. Average Volumes/ha and Confidence Interval @ 95% (Utilization level : 12.5 cm + net merch. less decay only /Tree Class 1,2)

238 ————— **271** ————— **305**

Audit Volume
(12.3% sampling error)

237 ————— **273** ————— **309**

Inventory Volume
(map label attributes predicted in VDYP)
(13.2% sampling error)

2. Ratio Analysis : Ratio of Means @95% (n=44)

$$R = \frac{\text{average audit volume}}{\text{average inventory volume}} = 0.99$$

1.0
↓

0.87 ————— **0.99** ————— **1.11**

* Since 1.0 is within the interval, the ratio indicates that there is no significant difference between the audit volume and the inventory volume for the area that is operable.

3. Paired T Test @ 95% ($\alpha=0.05$) for operable samples (n=44)

mean difference = -2.16 m³/ha

p - value for mean difference = 0.896

*since p-value > α , the difference is not significant

4. Paired T Test @ 95% for operable samples by map label GTG

There were no significant differences within any of the GTGs.

5. Correlation @ 95% ($\alpha=0.05$) for operable samples (n=44)

Correlation co-efficient $r = 0.545$

p value for correlation co-efficient < 0.001

$\therefore$ correlation is significant

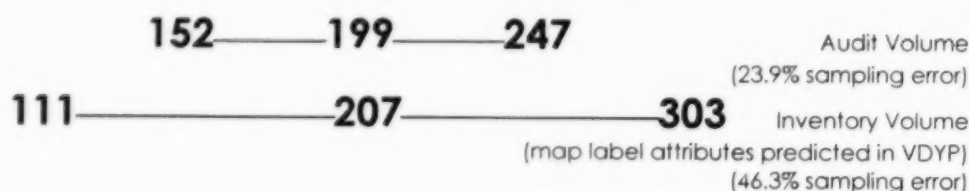
**ARROW TSA Inventory Audit:
Audit Volume vs. Inventory Volume (by GTG)
for Operable Samples**
(Tree Class 1 & 2, less decay only, 12.5cm + dbh)

Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Audit Volume (Kozak) vs. Inventory Volume (Predicted in VDYP) for Inoperable Samples (n=6)

1. Average Volumes/ha and Confidence Interval @ 95% (Utilization level : 12.5 cm + net merch. less decay only /Tree Class 1,2)



2. Ratio Analysis : Ratio of Means @95% (n=6)

$$R = \frac{\text{average audit volume}}{\text{average inventory volume}} = 0.96$$

1.0
↓

0.58 ————— 0.96 ————— 1.34

* Since 1.0 is within the interval, the ratio indicates that there is no significant difference between the audit volume and the inventory volume for areas that are inoperable.

3. Paired T Test @95% ($\alpha=0.05$) for samples that are inoperable (n=6)

mean difference = -7.93 m³/ha

p - value for mean difference = 0.813

*since p-value > α , the difference is not significant

4. Paired T Test @ 95% for inoperable samples by map label GTG.

There were no significant differences within any of the GTGs.

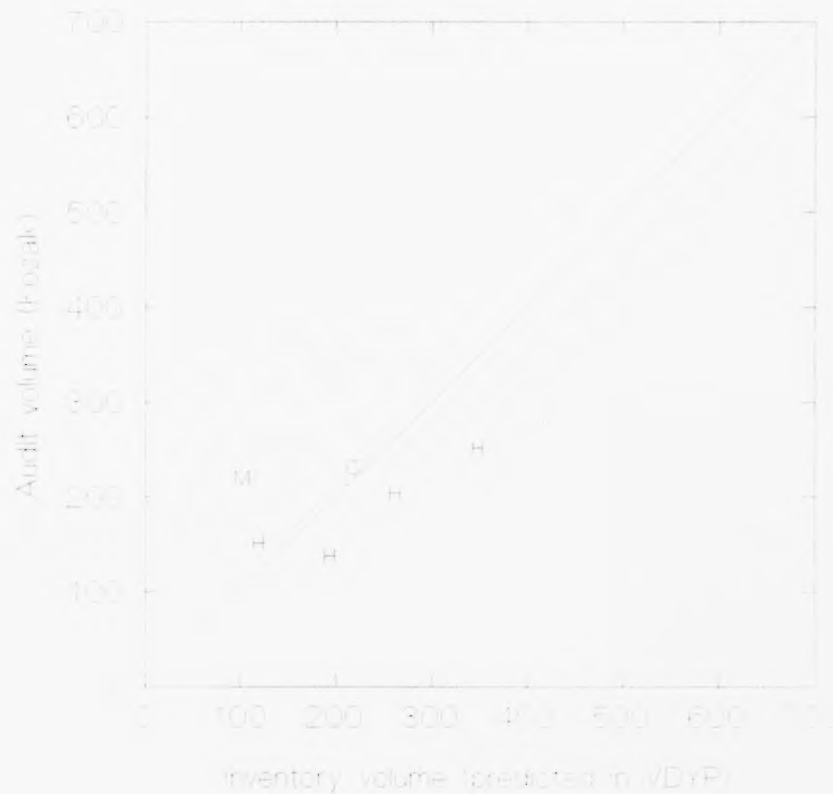
5. Correlation @ 95% ($\alpha=0.05$) for inoperable samples (n=6)

Correlation co-efficient $r = 0.521$

p value for correlation co-efficient = 0.289

∴ correlation is not significant

**ARROW TSA Inventory Audit:
Audit Volume vs. Inventory Volume (by GTG)
for Inoperable Samples
(Tree Class 1 & 2, less decay only, 12.5cm + dbh)**



Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Audit Volume (Kozak) vs. Inventory Volume (Predicted in VDYP)
(compilation excluding audit plots that field crew judged "outside of polygon") (n=50)

1. Average Volumes/ha and Confidence Interval @ 95% (Utilization level :
 12.5 cm + net merch. less decay only/Tree Class 1,2)

236	266	296	Audit Volume (11.3% sampling error)
232	265	299	Inventory Volume (map label attributes predicted in VDYP) (12.5% sampling error)

2. Ratio Analysis : Ratio of Means @95%

$$R = \frac{\text{average audit volume}}{\text{average inventory volume}} = 1.00$$

1.0
↓

0.89 ————— **1.00** ————— **1.12**

* Since 1.0 is within the interval, the ratio indicates that there is no significant difference between the audit volume and the inventory volume.

3. Paired T Test @ 95% ($\alpha=0.05$) for all sample polygons

mean difference = $0.77 \text{ m}^3/\text{ha}$

p - value for mean difference = 0.959

*since p-value > α , the difference is not significant

4. Paired T Test @ 95% for all sample polygons by map label GTG

There was a significant differences within GTG C.

(for GTG C: mean difference= $31 \text{ m}^3/\text{ha}$; p-value=0.041; n=6)

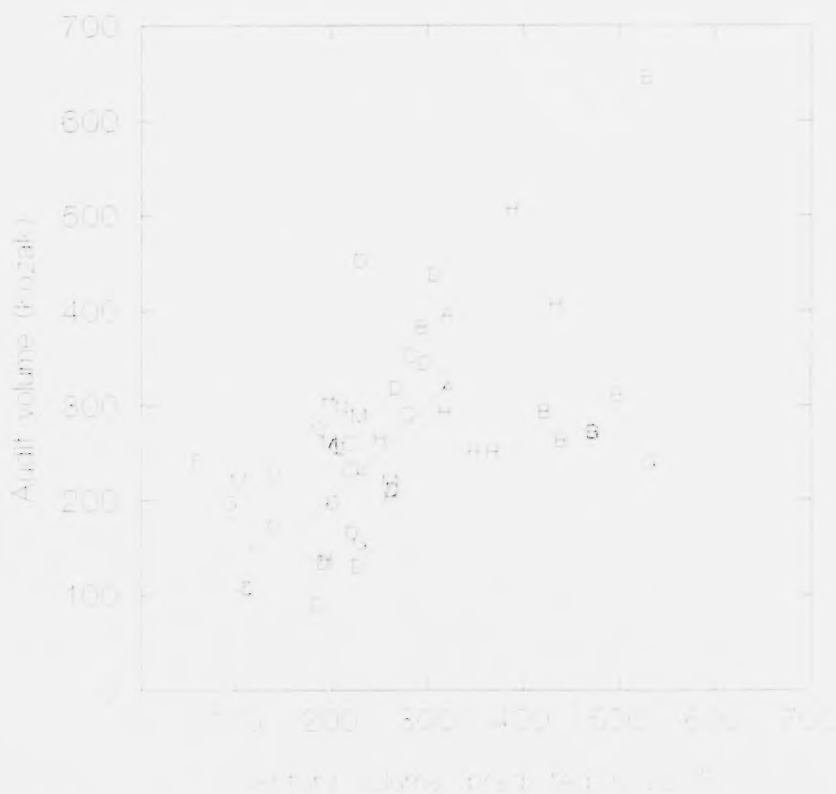
5. Correlation @ 95% ($\alpha=0.05$) for all samples

Correlation co-efficient $r = 0.557$

p value for correlation co-efficient < 0.001

$\therefore$ correlation is significant

ARROW TSA Inventory Audit:
Audit Volume vs. Inventory Volume (by GTG)
(compilation excluding audit plots that field crew judged
"outside of polygon")
(Tree Class 1 & 2, less decay only, 12.5cm + dbh)



Letter symbols correspond to map label GTG's as follows:

A	pure F	H	B, BH, BS
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
G	HF, HC, HB, HS	O	D Coniferous, A Coniferous

Inventory Classification Assessment

- 44% of the growth type groups from the inventory (ie. map labels) matched the audit growth type groups.
- the growth type group distribution for the 50 inventory audit samples is as follows (the bold italic entries on the diagonal in the table indicate a GTG match between the audit and the inventory):

Audit GTG (rows)	Inventory GTG (columns)															total
	A	B	C	D	E	G	H	J	K	L	M	N	O	P	Q	
A	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
B	1	3	0	2	0	0	0	0	0	0	1	0	0	0	0	7
C	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	6
D	0	0	1	2	0	0	0	0	0	1	0	0	0	0	0	4
E	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	2
G	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	4
H	0	0	0	1	0	0	7	0	0	0	0	0	1	0	0	9
J	0	1	0	0	0	2	3	0	0	0	0	0	0	0	0	6
K	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2
L	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
M	0	0	0	3	0	0	0	0	0	0	2	0	0	0	0	5
N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
O	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Q	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
total	2	6	6	13	0	4	10	0	0	3	4	1	1	0	0	50

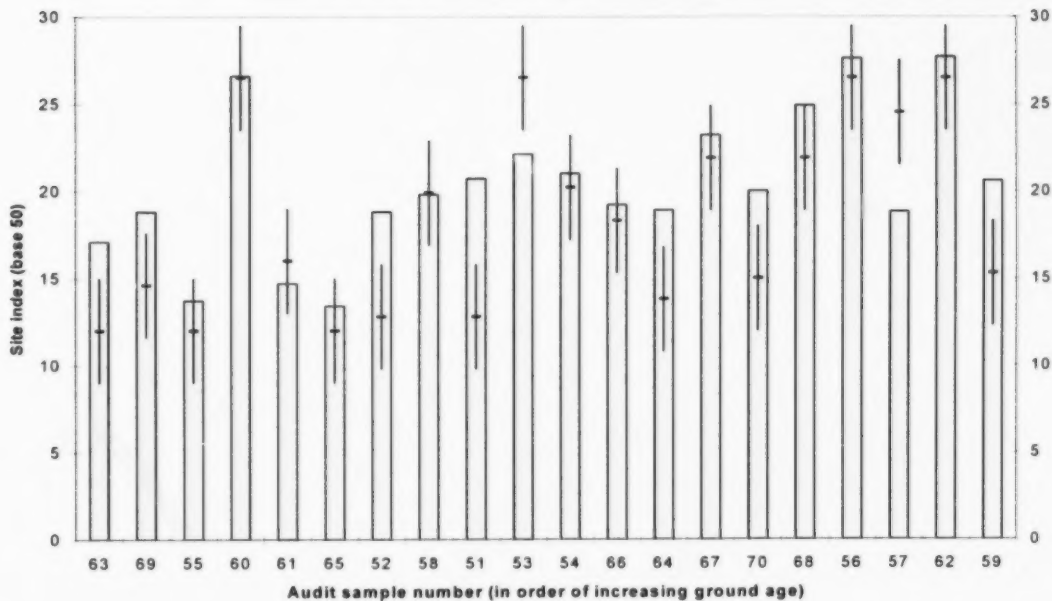
Letter symbols correspond to GTG's as follows:

A	pure F	K	SPI, SDeciduous
B	FC and F Cy, FH, FS	L	pure PI
C	FPL, F Py, F Deciduous, Py, Pa	M	PI F, PI S (and PI B)
D	FL, Pw, LF, L	N	PI Deciduous
E	C, CF, CH	O	D Coniferous, A Coniferous
G	HF, HC, HB, HS	P	DDeciduous, Mb, Bi, ADeciduous
H	B, BH, BS	Q	Cot. Coniferous, Cot. Deciduous
J	SF, SH (and SC), SB		

Immature Site Index and Classification Assessment

- **45%** of the growth type group assignments from the inventory (ie. map labels) matched the corresponding audit growth type group assignment.

ARROW TSA Inventory Audit: Comparison of Inventory and Audit Site Index for Immature Samples



Notes:

- shaded bars correspond to **audit site index** values
- tick marks on vertical lines represent **inventory site index** (vertical lines have arbitrarily been set at ± 3 around site index)
- audit site indices based on BH age where available (using Freddie)
- inventory site index was within 3m of the audit site index for 11 out of 20 samples (inventory site index was more than 3m higher than the audit site index for 2 samples and more than 3m lower than the audit site index for 7 samples)

